

FORM PTO-1386 (Modified)  
(REV 11-2000)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371**

010456

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.5)

09/807947

INTERNATIONAL APPLICATION NO.  
**PCT/DE99/03362**

INTERNATIONAL FILING DATE  
**16 October 1999**

PRIORITY DATE CLAIMED  
**21 October 1998**

TITLE OF INVENTION

**Integrated Polycrystalline Silicon Resistor with Carbon or Germanium**

APPLICANT(S) FOR DO/EO/US

**MEHR, Wolfgang**

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (24) indicated below.
4. ☒ The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
  - a. ☐ is attached hereto (required only if not communicated by the International Bureau).
  - b. ☒ has been communicated by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
  - a. ☐ is attached hereto.
  - b. ☒ has been previously submitted under 35 U.S.C. 154(d)(4).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
  - a. ☐ are attached hereto (required only if not communicated by the International Bureau).
  - b. ☒ have been communicated by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☐ An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
10. ☒ An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/ISPEA/409).
12. ☒ A copy of the International Search Report (PCT/ISA/210).

**Items 13 to 20 below concern document(s) or information included:**

13. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☐ A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
20. ☐ A second copy of the published international application under 35 U.S.C. 154(d)(4).
21. ☐ A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
22. ☒ Certificate of Mailing by Express Mail
23. ☒ Other items or information:

**a Assignee's Small Entity Status Certificate**

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.49) <b>09/807947</b>	INTERNATIONAL APPLICATION NO. <b>PCT/DE99/03362</b>	ATTORNEY'S DOCKET NUMBER <b>010456</b>
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24. The following fees are submitted: <b>BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :</b> <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... <b>\$1000.00</b> <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... <b>\$860.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... <b>\$710.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... <b>\$690.00</b> <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) ..... <b>\$100.00</b> <b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>		<b>CALCULATIONS PTO USE ONLY</b>  <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%; text-align: right;"><b>\$860.00</b></td> </tr> <tr> <td>Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)). <input type="checkbox"/> 20 <input type="checkbox"/> 30</td> <td style="text-align: right;"><b>\$0.00</b></td> </tr> <tr> <td><b>CLAIMS</b></td> <td></td> </tr> <tr> <td style="text-align: center;">NUMBER FILED</td> <td style="text-align: center;">NUMBER EXTRA</td> </tr> <tr> <td style="text-align: center;">RATE</td> <td></td> </tr> <tr> <td>Total claims 2 - 20 = 0 x \$18.00</td> <td style="text-align: right;"><b>\$0.00</b></td> </tr> <tr> <td>Independent claims 2 - 3 = 0 x \$80.00</td> <td style="text-align: right;"><b>\$0.00</b></td> </tr> <tr> <td>Multiple Dependent Claims (check if applicable). <input type="checkbox"/></td> <td style="text-align: right;"><b>\$0.00</b></td> </tr> <tr> <td><b>TOTAL OF ABOVE CALCULATIONS =</b></td> <td style="text-align: right;"><b>\$860.00</b></td> </tr> <tr> <td><input checked="" type="checkbox"/> Applicant claims small entity status. (See 37 CFR 1.27). The fees indicated above are reduced by 1/2.</td> <td style="text-align: right;"><b>\$430.00</b></td> </tr> <tr> <td><b>SUBTOTAL =</b></td> <td style="text-align: right;"><b>\$430.00</b></td> </tr> <tr> <td>Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)). <input type="checkbox"/> 20 <input type="checkbox"/> 30 +</td> <td style="text-align: right;"><b>\$0.00</b></td> </tr> <tr> <td><b>TOTAL NATIONAL FEE =</b></td> <td style="text-align: right;"><b>\$430.00</b></td> </tr> <tr> <td>Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/></td> <td style="text-align: right;"><b>\$0.00</b></td> </tr> <tr> <td><b>TOTAL FEES ENCLOSED =</b></td> <td style="text-align: right;"><b>\$430.00</b></td> </tr> <tr> <td></td> <td style="text-align: right;">Amount to be: refunded \$</td> </tr> <tr> <td></td> <td style="text-align: right;">charged \$</td> </tr> </table>			<b>\$860.00</b>	Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)). <input type="checkbox"/> 20 <input type="checkbox"/> 30	<b>\$0.00</b>	<b>CLAIMS</b>		NUMBER FILED	NUMBER EXTRA	RATE		Total claims 2 - 20 = 0 x \$18.00	<b>\$0.00</b>	Independent claims 2 - 3 = 0 x \$80.00	<b>\$0.00</b>	Multiple Dependent Claims (check if applicable). <input type="checkbox"/>	<b>\$0.00</b>	<b>TOTAL OF ABOVE CALCULATIONS =</b>	<b>\$860.00</b>	<input checked="" type="checkbox"/> Applicant claims small entity status. (See 37 CFR 1.27). The fees indicated above are reduced by 1/2.	<b>\$430.00</b>	<b>SUBTOTAL =</b>	<b>\$430.00</b>	Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)). <input type="checkbox"/> 20 <input type="checkbox"/> 30 +	<b>\$0.00</b>	<b>TOTAL NATIONAL FEE =</b>	<b>\$430.00</b>	Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable). <input type="checkbox"/>	<b>\$0.00</b>	<b>TOTAL FEES ENCLOSED =</b>	<b>\$430.00</b>		Amount to be: refunded \$		charged \$
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- a. ☒ A check in the amount of **\$430.00** to cover the above fees is enclosed.
- b. ☐ Please charge my Deposit Account No. \_\_\_\_\_ in the amount of \_\_\_\_\_ to cover the above fees. A duplicate copy of this sheet is enclosed.
- c. ☐ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. \_\_\_\_\_. A duplicate copy of this sheet is enclosed.
- d. ☐ Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

**NOTE:** Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

Law Offices of Karl Hormann  
86 Sparks Street  
Cambridge MA 02138-2216

SIGNATURE

Karl Hormann

NAME

26,470

REGISTRATION NUMBER

20 April 2001

DATE

09/8079 47

JC08 Rec'd PCT/PTO 20 APR 2001

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

International Application No.: PCT/DE99/03362  
International Filing Date: 16 October 1999  
Inventor: Mehr, Wolfgang  
For: Integrated Polycrystalline Silicon Resistor  
with Carbon or Germanium

86 Sparks Street  
Cambridge MA 02138-2216  
19 April 2001

Hon.  
Assistant Commissioner for Patents  
Washington DC 20231

**Box PCT**

**Preliminary Amendment**

Sir:

With a view to placing the English translation of his instant International Application as annexed to the International Preliminary Examination Report into a form believed to satisfy current U.S. patent prosecution standards, Applicant courteously requests that the following amendment be entered into the application.

In the Specification:

Page 1, line 7: insert --BACKGROUND OF THE INVENTION.--;

line 8: insert --1. Field of the Invention.--

line 11: insert --2. The Prior Art.--;

page 2, line 8: insert --OBJECTS OF THE INVENTION.--;

line 15: insert --BRIEF SUMMARY OF THE INVENTION.--;

page 3, line 24: insert --DESCRIPTION OF THE DRAWING.--;

line 27: insert --DETAILED DESCRIPTION OF THE INVENTION.--;

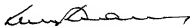
page 5, line 1: cancel "**Patent Claim**" and substitute --What is claimed is:--

therefor;

line 3: change "Integrated" to --An integrated--; and

line 9: change "Method" to --A method--.

Respectfully submitted,



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Karl Hormann

Registration No.: 26,470

Area Code 617.491.8867

<b>VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.101(b) AND 1.27 (c)) - SMALL BUSINESS CONCERN</b>			Docket No. 010456	
Serial No. 09/1802019.47 MAY 10 2001	Filing Date April 2001	Patent No.	Issue Date	
Applicant/ Patent Owner MEHR, Wolfgang				
Invention: <b>Integrated Polycrystalline Silicon Resistor with Carbon or Germanium</b>				
<p>I hereby declare that I am:</p> <p><input type="checkbox"/> the owner of the small business concern identified below:</p> <p><input checked="" type="checkbox"/> an official of the small business concern empowered to act on behalf of the concern identified below:</p> <p>NAME OF CONCERN: <u>IHP GmbH, Innovations for High Performance Microelectronics Institut fuer innovative....</u></p> <p>ADDRESS OF CONCERN: <u>Im Technologiepark 25, D-15236 Frankfurt (Oder), Germany</u></p> <p>I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.</p> <p>I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the above identified invention described in:</p> <p><input type="checkbox"/> the specification filed herewith with title as listed above.</p> <p><input checked="" type="checkbox"/> the application identified above.</p> <p><input type="checkbox"/> the patent identified above.</p> <p>If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed on the next page and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR 1.9(c) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).</p>				

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☒ no such person, concern or organization exists.  
☐ each such person, concern or organization is listed below.

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ Individual☐ Small Business Concern☐ Nonprofit Organization

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ Individual☐ Small Business Concern☐ Nonprofit Organization

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ Individual☐ Small Business Concern☐ Nonprofit Organization

FULL NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

☐ Individual☐ Small Business Concern☐ Nonprofit Organization

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING: \_\_\_\_\_

TITLE OF PERSON SIGNING \_\_\_\_\_

OTHER THAN OWNER: \_\_\_\_\_

ADDRESS OF PERSON SIGNING: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

Prof. A. Ourmazd  
Scientific Director

F. Weini  
Adm. Director

DATE: \_\_\_\_\_

20 April 2001

<b>VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) AND 1.27 (c)) - SMALL BUSINESS CONCERN</b>			Docket No. 010456
Serial No.	Filing Date 20 April 2001	Patent No.	Issue Date
Applicant/ <b>MEHR, Wolfgang</b> Patentee:			
Invention: <b>Integrated Polycrystalline Silicon Resistor with Carbon or Germanium</b>			
<p>I hereby declare that I am:</p> <p><input type="checkbox"/> the owner of the small business concern identified below:</p> <p><input checked="" type="checkbox"/> an official of the small business concern empowered to act on behalf of the concern identified below:</p> <p>NAME OF CONCERN: <u><b>IHP GmbH. Innovations for High Performance Microelectronics Institut fuer innovative...</b></u></p> <p>ADDRESS OF CONCERN: <u><b>Im Technologiepark 25, D-15236 Frankfurt (Oder), Germany</b></u></p> <p>I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.</p> <p>I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the above identified invention described in:</p> <p><input checked="" type="checkbox"/> the specification filed herewith with title as listed above.</p> <p><input type="checkbox"/> the application identified above.</p> <p><input type="checkbox"/> the patent identified above.</p> <p>If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed on the next page and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR 1.9(c) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).</p>			

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☒ no such person, concern or organization exists.  
☐ each such person, concern or organization is listed below.

FULL NAME  
ADDRESS

☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

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Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING:

Karl Hormann

TITLE OF PERSON SIGNING

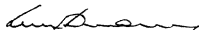
OTHER THAN OWNER:

Attorney for the Assignee

ADDRESS OF PERSON SIGNING:

86 Sparks Street  
Cambridge, MA 02138-2216

SIGNATURE:



DATE: 20 April 2001

5

**Integrated Polycrystalline Silicon Resistor  
with Carbon or Germanium**

10 The invention relates to an integrated high ohmic polycrystalline silicon resistor and to a method of its fabrication.

15 In microelectronics integrated resistors are being used in analog as well as in digital circuits or control circuits. These resistors are to possess the lowest possible tolerances and a high stability. Resistors based upon polycrystalline materials are a particularly cost-efficient variant, but for many applications high ohmic resistors in particular do not attain sufficient values of stability and tolerance.

20 In integrated circuits, semiconductor resistors are used because of their compatibility with conventional technological methods of fabrication and because of relatively simple possibilities of variation as, for instance, by doping. Amorphous as well as polycrystalline semiconductor layers, silicon in particular, are used as the basic material. Resistance properties such as, for instance, resistance value, resistance tolerances and temperature stability are  
25 essentially determined by the geometric dimensions of the resistance layer, by the basic material used, by the doping elements, the doping method applied, by the doping concentration and by the ensuing processes, above all by the temperature/time stresses arising in connection therewith.

30 Because of their grain structure, problems of stability arise in high ohmic polysilicon layers. These are caused in particular by the out-diffusion

of the dopants from the monocrystalline areas, the segregation of the dopants at the grain boundaries, the attachment of charge carriers in deep traps of the grain boundaries as well as by the formation of potential barriers at the grain boundaries associated therewith. The increase in resistance tolerance  
5 resulting therefrom, particularly by the temperature/time stress in ensuing process steps, and in the temperature coefficient leads to limitations in the application of high-ohmic polycrystalline resistors.

It is the task of the invention to propose an integrated high-ohmic  
10 polycrystalline silicon resistor and a method of its fabrication, in which the sensitivity to tolerances during the fabrication process and, hence, the resistance tolerance value are improved and the temperature coefficient is reduced relative to conventional resistors of this kind. Furthermore, it is a task of the invention to raise the stability of such resistors.

15 This task is accomplished, in accordance with the invention, by reducing the diffusion or the diffusion coefficient of the doping elements within the monocrystalline grains by the incorporation of carbon and/or by the use of polycrystalline SiGe with or without the addition of carbon.

20 In this manner it is possible to fabricate high-ohmic polysilicon resistors, having, in particular, resistance layer thicknesses  $R_s \geq 10^3 \Omega/\square$  with improved values of tolerance and stability.

25 A precipitation of  $Si_{1-y}C_y$  or SiGeC is used, instead of the hitherto conventional precipitation of pure and usually amorphous or polycrystalline Si layers followed by implantation and annealing or *in situ* doping with doping elements such as, for instance, boron, phosphorus, arsenic or antimony.

30 In this connection use is being made of the effect that adding carbon leads to a reduction of the diffusion coefficient of the doping elements, in

particular of boron, and thus to a reduction or prevention of the segregation effects at the grain boundaries or of the out-diffusion of the doping elements from the monocrystalline areas. This results in stabilization of the potential barrier and thus leads to a reduction in the temperature dependency of the resistor.

The use of SiGe as a basic material also leads to reduced temperature dependency.

The addition of carbon and/or germanium to the silicon may be carried out, for instance, *in situ* or by implantation followed by annealing.

The above-mentioned effects are improved by combining the two additives as a SiGe layer.

It is thus possible by the described method to fabricate high-ohmic polycrystalline silicon resistors with reduced temperature coefficients, increased stability and improved tolerance values.

Aside from the claims the characteristics of the invention are also apparent from the specification and drawings, the individual characteristics by themselves or in any combination constituting protectible embodiments for which protection is being sought here.

An embodiment of the invention is presented in the drawing and will be described in greater detail hereinafter.

Fig. 1 schematically depicts the structure of an integrated polycrystalline resistor. The resistor in accordance with the invention consists of a substrate 1, a dielectric substance 2, a doped polycrystalline layer 3 and metallic contacts 4. The polycrystalline layer 3 may consist of SiGeC, but

Si<sub>1-y</sub>C<sub>y</sub> or SiGe also lie within the ambit of the invention. The geometric dimensions and the doping of the polycrystalline layer 3 depend upon the resistance value to be achieved.

5           For purposes of fabrication, a dielectric substance 2 is precipitated on a substrate 1. This is followed by precipitation and structuring of the polycrystalline or still amorphous layer 3. In addition to boron doping, carbon and/or germanium is added to the silicon *in situ* or by implantation and subsequent annealing. The concentration of boron, carbon and germanium  
10 also depend upon the resistance value to be achieved. This is followed by a further precipitation of the dielectric substance 2 and by the fabrication of the metallic contacts 4.

          In connection with the present invention, an integrated high-ohmic  
15 polycrystalline silicon resistor and a method of its fabrication have been described on the basis of a concrete embodiment. It is, however, to be noted that the present invention is not limited to details of the embodiment described, since alterations and mutations are being claimed within the scope of the claims.

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## Patent Claims

1. Integrated high-ohmic polycrystalline silicon resistor comprising a substrate (1), a dielectric substance (2), a resistance layer and contacts (4), the resistance layer consisting of a polycrystalline layer (3) of SiGe:C and the polycrystalline layer (3) being doped with doping elements, in particular boron or phosphorus.
2. Method of fabricating an integrated high-ohmic polycrystalline silicon resistor of claim 1, characterized by the method steps of:
- precipitating a dielectric substance (2) on a substrate (1), in particular a silicon wafer,
  - forming a polycrystalline layer (3) of SiGe:C, the polycrystalline layer (3), the polycrystalline layer (3) being carried out by *in situ* precipitation of SiGe:C or implantation of Si with Ge:C followed by annealing, \*)
  - doping the polycrystalline layer (3) with doping elements, in particular boron or phosphorus;
  - further precipitation of the dielectric substance (2) and fabricating the metallic contacts (4).
- \*) Something is amiss in this section of the German claim. It should (in English translation) correctly state: "...the formation of the polycrystalline layer (3) being carried out...." (Translator's note).

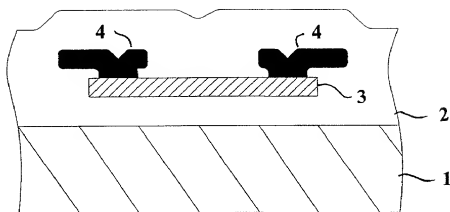


Fig. 1

Docket No.  
010456

# Declaration and Power of Attorney For Patent Application

## A English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

**Integrated Polycrystalline Silicon Resistor with Carbon or Germanium**

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on 20 April 2001 as United States Application No. or PCT International Application Number 09/807,947 and was amended on \_\_\_\_\_

(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Priority Not Claimed

198 49 471.8 ✓

Germany ✓

21 October 1998 ✓

☐

(Number)

(Country)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(Day/Month/Year Filed)

☐

(Number)

(Country)

(Day/Month/Year Filed)

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

55 N/A

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

PCT/DE99/03362 ✓

(Application Serial No.)

16 October 1999 ✓

(Filing Date)

Pending

(Status)  
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)  
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)  
(patented, pending, abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

**1-80** Karl Hormann, Esq., Registration No.: 26,470

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Sole or first inventor's signature

Date

20 April 2001

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Full name of second inventor, if any

Second inventor's signature

Date

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